$12.00 U.S.

Pilot's Guide for the SKYWATCH™ Traffic Advisory System Model SKY497

BFGoodrich Aerospace

BFGoodrich Avionics Systems, Inc.

EYES THAT NEVER BLINK™

Early Traffic Advisory Systems

In the early days of flight, when air traffic was light and slower moving, pilots were equipped with all they needed for effective collision avoidance–a sharp pair of eyes to scan the horizon.

Even today, visual contact is still the surest means of identifying intruder aircraft. But with more traffic in closer proximity and at higher speeds, today's pilots need all the help they can get.

For large commercial airliners, this need led to the development of TCAS II (Traffic Alert and Collision Avoidance System II); but that technology has proved to be too expensive and complex for most regional airlines, business, and general aviation aircraft.

SKYWATCH™

BFGoodrich Avionics Systems, Inc. recognized the need for a viable alternative to TCAS II and developed their TCAS I; but even TCAS I has proved to be too expensive for small business and general aviation aircraft. That's why BFG developed the SKYWATCH™ model SKY497 Traffic Advisory System.

The SKY497 provides most of the capabilities of TCAS I, but at a significantly lower cost making it practical for small aircraft. In addition, the SKY497 can share the display that comes with the STORMSCOPE® model WX-1000 so there's no need to buy another display if you already own a WX-1000 display (part number 78-8060-5900-8). The SKY497 can also display its traffic information on a growing number of multifunction displays from companies such as Avidyne, Eventide, and Garmin. You can even display SKYWATCH traffic information on a compatible weather radar indicator via the BFG Radar Graphics Computer, model RGC250.

Proven Experience

BFGoodrich Avionics Systems, Inc. has been involved in the development of collision warning programs since the early 1980's. In 1985, BFG began development of an enhanced collision warning system for the U.S. Navy which awarded BFG a contract for systems to be installed in T-34C training aircraft.

Based largely on the success of the Navy project, BFG was selected to validate the specifications for TCAS I under an ARINC contract with the FAA. The completion of this contract represented another first for BFG's TCAS I unit, the TCAS791; it was the first TCAS I to be TSO'd, first to receive a full, unrestricted STC, first to fly, and first to be delivered.

The BFGoodrich tradition of aerospace innovation dates back to the earliest days of powered flight when BFG supplied tires for the Glenn Curtiss pusher. Since then, BFG has developed a wide range of aerospace products and services including flight instrumentation and avionics.

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Safety Summary

These warnings and cautions appear later in this guide and are repeated here for emphasis:

CAUTION (page 2-4)

To avoid power surges that could damage the SKY497 and the optional WX-1000, start your engines before turning on the SKY497.

WARNING (page 2-8)

If the SKY497 is in SKYWATCH mode, the display will not automatically switch into STORMSCOPE mode to display thunderstorms or STORMSCOPE errors: You must use the remote SKYWATCH/STORMSCOPE mode switch to periodically check for thunderstorms or STORMSCOPE errors.

WARNING (page 2-8)

The SKY497 relies on information obtained from transponders in nearby aircraft. The SKY497 does not detect or track aircraft which are not equipped with an operating ATCRBS transponder.

WARNING (page 2-8)

The SKY497 does not track intruder aircraft approaching at a closure rate greater than 900 knots.

WARNING (page 2-8)

Some traffic within the chosen display range may not be displayed due to traffic prioritizing or antenna shielding.

CAUTION (page 2-8)

Optimum SKY497 performance is realized when intruder aircraft are reporting their altitude (via a mode C or other altitude reporting transponder).

WARNING (page 2-9)

Do not attempt evasive maneuvers based solely on traffic information shown on the SKY497 display. Information on the display is provided to the flight crew as an aid in visually acquiring traffic; it is not a replacement for ATC and See & Avoid techniques.

Table of Contents

Page

List of Illustrations iv

List of Tables iv

Chapter 1 System Description 1-1
General Description 1-1
Transmitter Receiver Computer (TRC) 1-1
Directional Antenna 1-1
Display 1-2
Interaction of Major Components 1-2
Functional Description 1-4
Features 1-4

Chapter 2 Operating Instructions 2-1
Controls & Indicators 2-1
Turn On the SKY497 2-4
Run the Operator-Initiated Self Test 2-4
Switch Between Standby and Normal Operating Mode 2-6
Change the Display Range 2-6
Change the Altitude Display Mode 2-7
Switch Between SKYWATCH™ and STORMSCOPE® Modes (Optional) 2-8
Observe the Display 2-8
Respond to Traffic Advisories 2-9
Turn Off the SKY497 and the Optional WX-1000 2-9
Failure Response 2-9
Operate the Optional WX-1000 When the SKY497 is Removed 2-10
Operate the SKY497 When the Optional WX-1000 is Removed 2-10

Chapter 3 Principles of Operation 3-1
Introduction 3-1
Sensitivity Levels 3-1
Sensitivity Level A 3-2
Sensitivity Level B 3-2
Audio Inhibit, SKY497 3-2
Audio Inhibit, GPWS 3-4
TA Symbol Duration 3-4
Ground Target Filtering 3-4

Chapter 4 Display Interpretation 4-1
Introduction 4-1

Chapter 5 Specifications 5-1

Chapter 6 Warranty Information 6-1
Introduction 6-1
Warranty Statement 6-1
Related Policies and Procedures 6-2

List of Illustrations

Figure	Title	Page
1-1	SKY497 Major Components	1-1
1-2	Display with Typical SKYWATCH Screen	1-2
1-3	Display with Typical STORMSCOPE Screen (Optional)	1-2
1-4	SKY497 Simplified Functional Diagram	1-3
1-5	Altitude Display Modes and Traffic Zones	1-5
2-1	SKY497 Controls and Indicators	2-1
2-2	BFGoodrich Screen	2-5
2-3	SKY497 Standby Screen	2-5
2-4	In-Flight Traffic Screen	2-5
2-5	SKY497 Failed Screen	2-5
2-6	Operator-Initiated Test Screen	2-5
2-7	Traffic Screen Set on 6 nmi Range	2-6
2-8	Traffic Screen Set on 2 nmi Range	2-6
2-9	Altitude Display Modes	2-7
3-1	TA Zones If Your Aircraft Has a Radio Altimeter	3-3
3-2	TA Zones If Your Aircraft Has No Radio Altimeter, But Does Have Retractable Landing Gear	3-3
3-3	TA Zones If Your Aircraft Has Fixed Landing Gear and No Radio Altimeter	3-4
4-1	Traffic Advisory and Other Traffic	4-1
4-2	Out-of-Range Traffic Advisory	4-1
4-3	Non-Altitude-Reporting Traffic	4-2
4-4	SKY497 Standby Screen	4-2
4-5	SKY497 Failed Screen	4-2

List of Tables

Table	Title	Page
2-1	SKY497 Controls and Indicators	2-1
3-1	Ten Situations in Which a Traffic Advisory Will Occur	3-1
5-1	Transmitter Receiver Computer (TRC497) Specifications	5-1
5-2	WX-1000/SKY497 Display Specifications	5-2
5-3	NY164 Directional Antenna Specifications	5-2

Chapter 1
System Description

General Description

The SKYWATCH™ model SKY497 from BFGoodrich Avionics Systems, Inc. is an airborne Traffic Advisory System (TAS). It monitors the airspace around your aircraft and advises the flight crew where to look for transponder-equipped aircraft that may pose a collision threat. The SKY497 is intended for use by corporate and general aviation aircraft. Figure 1-1 shows the major components of the SKY497.

The SKY497 displays traffic information on a BFG WX-1000/SKY497 display and generates aural announcements on the cockpit audio system. The display can be dedicated to the SKY497 or shared with a STORMSCOPE® Weather Mapping System (model WX-1000) using a remote SKYWATCH/STORMSCOPE mode switch.

Traffic information on the CRT display consists of green symbols and text. The traffic information generally includes the relative range, bearing, and altitude of intruder aircraft.

Figure 1-1. SKY497 Major Components

Transmitter Receiver Computer (TRC)

The TRC is the primary unit of the SKY497. It contains the circuitry necessary to convert inputs from the directional antenna and from other aircraft systems into an on-screen representation of intruding aircraft, and if necessary, aural traffic advisories. The TRC can track up to 30 intruder aircraft simultaneously, but to reduce clutter, the SKY497 only displays the eight most threatening intruders being tracked. The TRC also contains Built-In Test Equipment (BITE) which detects faults and verifies proper operation.

Directional Antenna

The directional antenna transmits omnidirectional mode C interrogations and receives directional replies from other transponder-equipped aircraft in the vicinity.

Display

The display is a self-contained, 3-ATI-sized unit with a high resolution, green monochrome Cathode Ray Tube (CRT) display. The bezel contains four momentary contact push-button switches and an on/off/brightness knob. The display provides control and display functions for the SKY497 and for a WX-1000 STORMSCOPE (if installed).

The display does not display traffic and storm information simultaneously. The position of a remote SKYWATCH/STORMSCOPE mode switch determines whether the display displays traffic or storm information; however, if you're in STORMSCOPE mode and the SKY497 detects traffic that may pose an immediate threat to your aircraft, the display will temporarily switch to SKYWATCH mode. Figure 1-2 shows the display with a typical SKYWATCH screen. Figure 1-3 shows the display with a typical STORMSCOPE screen.

Figure 1-2. Display with Typical SKYWATCH Screen

Figure 1-3. Display with Typical STORMSCOPE Screen (Optional)

Interaction of Major Components

Figure 1-4 shows how the major components of the SKY497 connect to each other and to other aircraft systems.

Notes on Figure 1-4:

1. The optional radio altitude input affects the SKY497 audio inhibit feature, the ground target filtering feature, and the sensitivity levels feature. (See chapter 3 for details.)
2. A flight data computer or other Arinc 429 output device may replace individual analog sensors for supplying barometric altitude & heading.
3. The SKY497 will work *without* a heading input, but it will experience degraded performance during high-rate-of-turn maneuvers.
4. The SKY497 may be installed on aircraft with fixed landing gear. The optional landing gear position input affects the sensitivity levels feature. (See chapter 3 for details.)

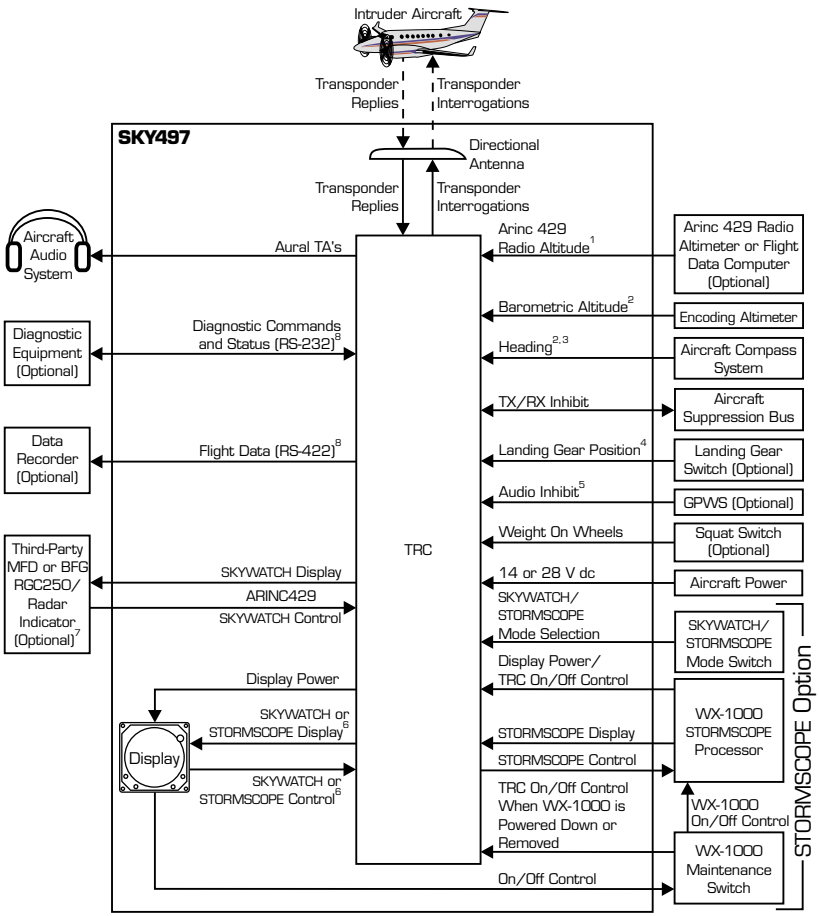


Figure 1-4. SKY497 Simplified Functional Diagram

5. This audio inhibit input is only required if you have a Ground Proximity Warning System installed.
6. The position of the SKYWATCH/STORMSCOPE mode switch determines whether the display displays SKYWATCH or STORMSCOPE information. The switch also determines whether the buttons on the display control the SKYWATCH or STORMSCOPE system.
7. The optional MFD or RGC250/radar indicator can be in place of, or in addition to the standard WX-1000/SKY497 display.
8. The flight data RS-422 output and the diagnostic RS-232 input/output are not required for normal SKY497 operation.

Functional Description

The SKY497 is an active system that operates as an aircraft-to-aircraft interrogation device. The SKY497 interrogates transponders in the surrounding airspace similar to the way that ground-based radar interrogates aircraft transponders. When the SKY497 receives replies to its interrogations, it computes the responding aircraft's range, bearing, relative altitude, and closure rate. The SKY497 then plots the traffic location and predicts collision threats.

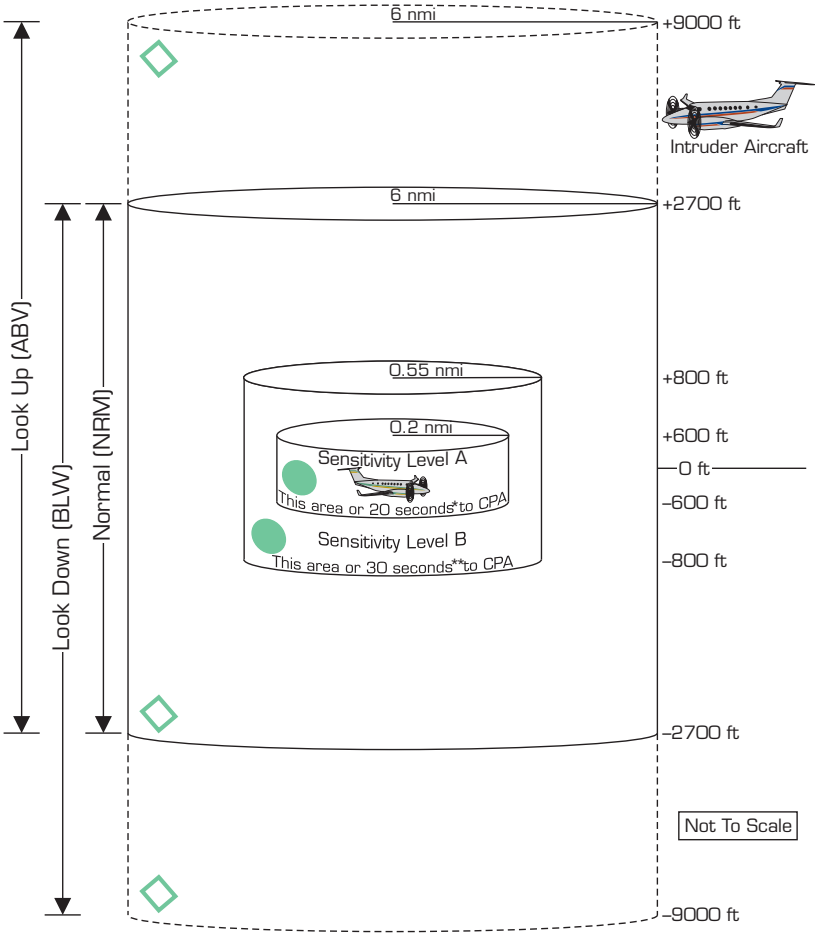
Figure 1-5 shows the SKY497 altitude display modes (look up, look down, and normal). The figure also shows the traffic zones around your aircraft and the traffic symbols that appear on the display when intruding aircraft enter one of those zones.

A solid circle is the visual part of the Traffic Advisory (TA) that the SKY497 generates when it predicts that an intruder aircraft may pose a collision threat. The aural part of the TA, "traffic, traffic," is annunciated over a cockpit speaker or headset. An open diamond represents traffic that does not pose an immediate collision threat.

The SKY497 uses either sensitivity level A (SLA) or sensitivity level B (SLB) to determine when to display a TA. In general, SLB is used during the in-flight phase and SLA is used during takeoff and landing. Sensitivity levels and other factors affecting the display of traffic symbols are discussed in detail in chapter 3. Look up, look down, and normal altitude display modes are described in chapter 2.

Features

- Tracks up to 30 intruder aircraft (displays the 8 most threatening)
- Tracks intruder aircraft approaching at closure rates up to 900 knots
- Fraction of the cost of a TCAS I or II
- Does not require a mode S transponder
- Two horizontal display ranges (6 nmi and 2 nmi)
- Three altitude display modes: normal (±2,700 ft), look up (–2,700 ft to +9,000 ft), and look down (–9,000 ft to +2,700 ft)
- Generates visual *and* aural advisories of aircraft that may pose a collision threat
- Automatic and pilot-initiated self test functions
- High-resolution, green monochrome, CRT display
- Can transmit interrogations from the ground as well as from the air
- Can share a display with the STORMSCOPE WX-1000
- Can display its traffic information on a compatible weather radar indicator (via a BFG RGC250) or on a third-party multifunction display in addition to, or in place of the BFG display.
- Automatically switches back to the SKYWATCH screen from the STORMSCOPE screen when a TA is issued
- Uses only one antenna
- Display fits in a standard 3-ATI cutout in the cockpit panel



*15 seconds for non-altitude reporting intruder aircraft
**20 seconds for non-altitude reporting intruder aircraft
Refer to chapter 3 for details. CPA means Closest Point of Approach.

Figure 1-5. Altitude Display Modes and Traffic Zones